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METHOD FOR DETERMINATION OF LINT AND TRASH CONTENT OF COTTON BY MEANS OF MECHANICAL-PNEUMATIC MACHINES

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Indian Standard

METHOD FOR DETERMINATION OF LINT AND TRASH CONTENT OF COTTON BY MEANS OF MECHANICAL-PNEUMATIC MACHINES

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 6 December 1968, after the draft finalized by the Physical Methods of Test Sectional Committee had been approved by the Textile Division Council.

0.2 The determination of lint and trash content of raw cotton is important since the presence of trash directly influences the net amount of yarn or cloth that can be manufactured from a given lot of cotton.

0.3 The amount of trash remaining in various intermediate products like scutcher lap, card sliver, etc, indicates the cleaning efficiency of the processes or machines. Also the amount of useful lint present in the waste removed at various machines helps in making the adjustment and settings of various cleaning points of the machines. Thus, the analysis of intermediate products and wastes for lint and trash contents helps in profitable adjustment and operation of the machines to clean the cotton to a pre-determined degree.

0.4 The standard is based on the practices prevalent at present in the country and is particularly suited for the Shirley analyser. Assistance has also been derived from Doc: ISO/TC 38 (Secretariat — 269) 408 'Draft proposal for an ISO Recommendation: Determination of lint and waste content of cotton by means of mechanical-pneumatic machines'.

0.5 In reporting the result of a test made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960*.

1. SCOPE

1.1 This standard prescribes a method for determination of lint and trash content of cotton fibres by means of mechanical-pneumatic machines. The method is applicable to cotton taken from bales, laps, slivers or other sources of lint cotton.

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*Rules for rounding off numerical values (*revised*).

1.1.1 The method may also be used for analysing the waste removed by different machines for the lint and trash content.

2. PRINCIPLE

2.1 A known weight of the specimen is fed to the machine. The specimen is well opened by the machine and then discharged in an air stream. The air stream carries the fibres to the surface of a condenser cage and allows the heavier particles of trash to fall down. The lint and the waste are collected in separate compartments. The amount of lint and trash so collected are separately weighed and computed as the percentages of the original weight of the specimen.

3. TERMINOLOGY

3.0 For the purpose of this standard, the following definitions shall apply.

3.1 Lint Content — The portion consisting of cotton fibres separated from the specimen and essentially free from trash.

3.2 Trash Content — The amount of material other than fibres collected from the specimen in test.

3.3 Invisible Waste (Cage Loss) — The part of specimen not accounted for by adding together the lint and trash contents.

4. SAMPLING

4.1 The sample in case of raw or processed cotton shall not be less than 0·5 kg. However in the case of processed waste, the samples of approximately 100 g may be drawn. The sample should be drawn in such a way that it is representative of the lot.

5. CONDITIONING AND TESTING OF TEST SPECIMENS

5.1 The test specimens shall be conditioned to equilibrium and weighed in a standard atmosphere at 65 ± 2 percent relative humidity and 27 ± 2°C temperature (*see also* IS : 196-1966*).

5.2 The testing may be carried out in the prevailing atmospheric conditions, preferably having a relative humidity between 45 and 60 percent and temperature between 20° and 35°C provided test specimens and the lint and trash portions (after testing) are conditioned and weighed in the standard atmosphere.

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*Atmospheric conditions for testing (*revised*).

6. APPARATUS

6.1 Balance — a balance of sufficient capacity and capable of weighing to an accuracy of 10 mg.

6.2 Analyser — a machine working on mechanical-pneumatic principle capable of separating trash and lint fractions. The machine shall be equipped with accessories given in **6.2.1** to **6.2.3**.

6.2.1 *Containers* — for holding the specimen and different fractions thereof.

6.2.2 *Brushes* — for assisting in the collection of fractions from various compartments.

6.2.3 *Gauges and Tools* — for making adjustments and settings of the machine.

NOTE — One commercially available analyser namely Shirley analyser is described in Appendix A.

7. PREPARATION OF TEST SPECIMENS

7.1 From the sample (s) as obtained in **4.1**, draw test specimens in such a way that these are representative of the sample(s), but at the same time keep the number of pieces making up the specimen to a minimum consistent with the representative sampling.

NOTE — While preparing the samples from the lot and specimens from the samples, take care that no trash is lost in handling.

7.2 The test specimen shall be of the size in conformity with what is specified in the operating instructions for the instrument being used. A small deviation from the exact prescribed size is justified, if it helps in preventing shedding of trash during drawing and weighing. Weigh the specimen to an accuracy of 100 mg (M).

7.3 Test at least 2 test specimens.

8. PROCEDURE

8.0 Make the necessary preliminary adjustments in accordance with the instructions given in Appendix A or with the manufacturers' instructions.

8.1 Shake the specimen so that large particles of trash (which may otherwise damage the machine) are removed from the specimen; preserve these droppings for incorporation in the trash in **8.6**. Spread the specimen on the feed plate between the guide plates in the form of an even layer after opening out the hard lumps, if any (for details *see* Appendix A).

8.2 Start the machine and let the trash and lint collect in their respective compartments (for details *see* Appendix A).

8.3 Take out the lint from the delivery box and pass it again through the machine without disturbing the trash in the settling chamber. Stop the machine and collect the lint and keep it in a separate container (L_1).

8.4 Remove all the trash particles containing lint from the trash tray and settling chamber and pass it through the machine. Collect the lint from the delivery box.

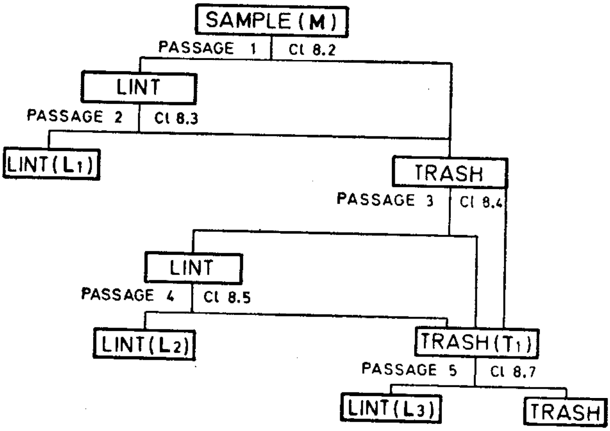
8.5 Pass the lint collected as in **8.4** through the machine without disturbing the trash. Collect the lint and keep it in a separate container (L_2).

8.6 Collect all the trash in the trash tray, settling chamber and any seeds clinging to the wires of the taker-in cylinder and combine them. Weigh them to an accuracy of 100 mg and if the weight is less than 10 g, weigh to an accuracy of 10 mg (T_1).

8.7 Pass the particles containing lint again through the machine and ignore the trash collected. Collect the lint and keep it in a separate container and weigh to an accuracy of 10 mg (L_3).

8.8 Combine all the portions of the lint (L_1, L_2 and L_3) as collected in **8.3**, **8.5** and **8.7** and weigh to an accuracy of 10 mg.

NOTE — A schematic representation of the procedure is given below:



9. CALCULATION

9.1 Calculate the results as lint content, trash content (visible waste content), and invisible waste content as percentages of the original specimen by the following formulæ:

a) Lint content (L), in percent $= \dfrac{L_1 + L_2 + L_3}{M} \times 100$

b) Trash content (visible waste) (T), in percent $= \dfrac{(T_1 - L_3)}{M} \times 100$

c) Invisible waste content (W), in percent $= 100 - (L + T)$

where

L_1, L_2 and L_3 = weight of the lint portion in grams as in **8.3**, **8.5** and **8.7** respectively;

T_1 = total weight of trash portion in grams; and

M = weight of the specimen in grams.

NOTE — The calculation of invisible waste content may be omitted if agreed between the concerned parties. In such a case, obviously, the combined weights of trash and lint would be less than the original weight of the sample.

10. REPORT

10.1 The test report shall include the following:

a) Type of material tested (whether raw cotton, sliver, lap or waste from some machine);

b) Number and weight of specimens tested;

c) Name of the machine used;

d) Atmospheric conditions under which the test is conducted; and

e) The percentage of the following or any of them as agreed to between the concerned parties:

   1) Lint content,
   2) Trash content, and
   3) Invisible waste content.

APPENDIX A

(*Note* under 6.2.3)

DESCRIPTION AND OPERATION OF SHIRLEY ANALYSER

A-1. The Shirley analyser separates lint and trash by making use of the difference of their buoyancies in the air. The specimen is fed to the taker-in cylinder with the help of feed roller and feed plate arrangement. The fibres are opened by the taker-in cylinder and are carried by an air stream and deposited on a cage similar to a condensing screen. The air stream is so adjusted that it carries only the cotton fibres and dust, leaving the trash to fall in the lower portion of the machine. The dust passes through the cage to the exhaust and the fibres are collected in the delivery box.

A-2. Before using the machine, the delivery box, trash tray, settling chamber, etc, should be swept clean. If the machine has not already been used during the day, start the motor and run the machine for 2 or 3 minutes for warming up, keeping the clutch disengaged and the feed roller inoperative.

A-3. Spread the specimen uniformly to cover the whole area between the guides on the feed plate, teasing out hard lumps where necessary. When making tests on slivers, short lengths should be spread on the feed plate perpendicular to the feed roller. Open the valve to its fullest extent, engage the clutch and observe the character of the trash as it begins to fall into the tray. Only small amounts of unopened lint should be falling with the trash in this first passage and, for hard cotton, it may occasionally be necessary to tighten the loading springs on the feed rollers. When all the specimen has passed under the feed roller, as indicated by the absence of fibres under the streamer plate, disengage the clutch and close the valve momentarily to allow the lint to be collected from the delivery box.

A-4. The weight of the specimen shall normally be 100 g.

A-5. Speeds and settings of the Shirley analyser shall be as follows:

Speeds of	rev/min
Taker-in cylinder	900
Feed roller	0·9
Cage	80
Fan	1 500
Motor	1 400 approx

Setting Between	mm	in
Feed plate and taker-in	0·1	(4/1 000)
Streamer plate (lead-in edge) and taker-in	0·15	(5/1 000)
Streamer plate (lead-off edge) and taker-in	0·2	(7/1 000)
Stripping knife (bottom edge) and taker-in	0·1	(4/1 000)
Stripping knife (bottom edge) and cage	8·0	(5/16)
Taker-in and cage	5·0 to 6·0	(13/64 to 15/64)
Separation sheet (top edge) and cage	6·0	(1/4)
Delivery plate and cage	1·5	(1/16)

NOTE 1 — Specially-designed feed plate for staples above 32 mm is available, the use of which minimizes fibre breakage on long-staple cotton. It is used when further tests are to be made on the lint portion but the results of the analyser are not affected by its use. For the purpose of this test, the usual plate having a flat striking face of 28·6 mm (1-1/8 in) shall be used.

NOTE 2 — The filter bags shall be kept clean to avoid back pressure.

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